Research Report 1316

AD A130940

EXECUTIVE SUMMARY
EVALUATING THE EFFECTIVENESS OF SOLDIER'S MANUALS: A FIELD STUDY

Paul H. Radtke and Harris H. Shettel
American Institutes for Research

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March 1981

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REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER: Research Report 1316	2. GOVT ACCESSION NO.: AD-A130940
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle): EXECUTIVE SUMMARY: EVALUATING THE EFFECTIVENESS OF SOLDIER'S MANUALS: A FIELD STUDY	5. TYPE OF REPORT & PERIOD COVERED: Executive Summary
	6. PERFORMING ORG. REPORT NUMBER: AIR 3/81 - 74500 - ES
7. AUTHOR(s): Paul H. Radtke and Harris H. Shettel	8. CONTRACT OR GRANT NUMBER(s): MDA 903-78-C-2033
9. PERFORMING ORGANIZATION NAME AND ADDRESS: American Institutes for Research, 1055 Thomas Jefferson Street, N.W., Washington, DC 20007 Suite 200	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: 2Q763731A770
11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Army Research Institute for the Behavioral and Social Sciences, 5001 Eisenhower Avenue, Alexandria, VA 22333	12. REPORT DATE: March 1981 13. NUMBER OF PAGES: 54
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office): --	15. SECURITY CLASS. (of this report): Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

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18. SUPPLEMENTARY NOTES

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Training
Performance effectiveness
Testing
Combat readiness
Soldiers' manual
skill qualification test

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Since 1976, the U.S. Army has been preparing and distributing to each individual soldier a series of documents called Soldier's Manuals (SMs) which describe all the tasks that are critical to the successful performance of his or her duties in his or her MOS and skill level. This two-year study was designed to provide those who prepare SMs with information on how they are being used, factors that influence use or disuse and the relationship between SM usage and the soldier's ability to perform his or her job skills, as

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measured by SQT scores. Questionnaire data were obtained from 1,224 soldiers in CONUS and USAREUR from 25 combat and noncombat MOS. Patterns of reported usage were examined and characteristics of the documents themselves were analyzed. SQT scores were related to usage factors to see to what extent they were correlated. Finally, senior level interviews were used to obtain insights into ways the SM is functioning as part of the larger EPMS. Recommendations are made relating to the physical characteristics of the SM, the preparation, contents, and format of the SM, and the general climate of support for SM use.

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Office, Deputy Chief of Staff for Personnel
Department of the Army

March 1981

Army Project Number
2Q763731A770

Performance-Oriented
Skills Development and Evaluation

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Foreword

The mission of the Training Technical Area of the Army Research Institute for the Behavioral and Social Sciences (ARI) is to provide research support to Army training programs. A major focus of this research is to develop fundamental data and technology necessary to field integrated training systems for improving individual job performance. Such systems include Skill Qualifications Tests (SQT), job performance aids, training courses in schools and the field, performance criteria, and management and feedback systems. This report is one of a series of research on the factors which relate to SQT performance. This research program will develop criteria for increasing the effectiveness of SQTs for assessing and ultimately, improving individual job performance. This work is in response to requirements of the Army Training Support Center (ATSC) of the Army Training and Doctrine Command (TRADOC). This research was accomplished under Army Project 2Q763731A770, FY78. Personnel of ARI and the American Institutes for Research under Contract MDA903-78-C-2033 performed this research.

JOSEPH ZEIDNER
Technical Director

ACKNOWLEDGEMENTS

The authors of this Executive Summary wish to acknowledge the much larger cast of characters who made significant contributions to the overall study.

From the American Institutes for Research:

Andrew M. Rose
Daniel B. Felker
George R. Wheaton
Ingrid Heinsohn
Tania Ramashko*
Tetsuro Motoyama*
Paul Fingerman*
Leslie Kramer*

*no longer at AIR

From the Army Research Institute:

Stanley F. Bolin
Melvin A. Barba
Frank Yekovich*
Milton Maier*

*no longer at ARI

Apprecition is also extended to the many individuals at the various test sites who completed questionnaires and submitted to lengthy interviews.

Harris H. Shettel

Project Director

BRIEF

Requirement:

To determine to what extent the Soldier's Manual (SM) is being used by personnel in the field and whether such use is contributing to job skill proficiency.

Procedure:

Questionnaires were administered to 1,224 soldiers in eight Combat Arms and seventeen Combat Support MOS. In addition, individual interviews were held with senior enlisted (N=141) and officer (N=56) personnel. Finally, scores were obtained for all those in the sample who had taken the SQT. Data were collected at three CONUS and nine USAREUR sites in 1979. Information was obtained on characteristics of: (a) the SM user, (b) the training environment, and (c) the SM document itself. These data were related to patterns of SM usage, which was in turn related to level of individual job performance as indicated by SQT scores.

Findings:

Major findings are as follows:

1. General SM usage is high (82% of sample used it at least once);

2. Combat Arms personnel tend to use the SM more than Combat Support personnel; USAEUR more than CONUS.

3. SM usage increases with rank and years of Army experience.

4. SM usage is driven largely by the need to study for the SQT.

5. Higher levels of support of the SM concept by senior level personnel is associated with higher levels of usage by lower level personnel.

6. The SM document itself is not able to withstand hard physical use.

7. A high percentage of SM users report that tasks in the SM differ from the way they are done on the actual job (73%), do not tell what is needed to do the job (39%), and contain one or more technical errors (42%). Lack of job relevance is more evident in the Combat Support MOS than in the Combat MOS.

8. There is a small but statistically significant positive correlation between the extent of SM usage and scores on the SQT.

Utilization of Findings:

Specific recommendations have been made in writing to Fort Eustis and to all Proponent Schools, based on the above findings. They include ways to improve the physical characteristics of the SM, the climate of support of the SM, and the accuracy and completeness of the contents of the SM.

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INTRODUCTION

Background

Since 1976 the U.S. Army has been preparing and distributing a series of training documents to each soldier which describe "the tasks that are critical to survival and successful mission performance on the modern battlefield," otherwise known as the Soldier's Manuals (SM). The overall purpose of these manuals is to provide "a well-illustrated, one-stop training and evaluation guide," that informs each soldier and his or her superiors what tasks the soldier is expected to perform and how to perform them. The manuals are further intended to provide "the prescribed performance measures, conditions, and standards for each task, given the soldier's Military Occupational Specialty (MOS), skill level and duty position." Finally, the manuals are intended to provide suggestions and references to aid supervisors and commanders in the training of soldiers to the desired level of proficiency on required tasks. (Reference: TRADOC Circular 351-28, Chapter 3, Paragraph 3-1a, 4 December, 1978).

This report summarizes the findings and recommendations of a two year study of the characteristics, use and effectivenss of the SMs.* This study addressed three major issues:

1. How Soldier's Manuals are being used by the individual soldier in the field,

2. The factors that influence their use or disuse, and

3. The relationship between SM usage and the level of individual job skill and performance in the field.

The first issue relates both to the extent and the kinds of uses to which the SM is being put. To what extent are SMs being used by soldiers in the field, and if so, how are they used, by whom, and for what purposes? A major focus of the study was on the role of the SM in the Army's performance-based training, testing, and skill level advancement process. Under this process, called the Enlisted Personnel Management System (EPMS), promotions depend both on daily job performance and on test results. Within EPMS the SM is intended to be a primary source of information for individual soldiers to learn their job and to demonstrate that learning on the Skill Qualification Tests (SQT). Therefore, the study also examined the use of the SM as a reference and aid in daily job performance and as a guide to other training or procedural documents.

*A more complete technical report on the study, dated February 1981, has been prepared and submitted to the U.S. Army Research Institute (AIR-2/81-74500-FR).

The second issue addressed in the study was to identify and describe the factors that influence the pattern of SM usage. Three sets of factors were examined:

- Characteristics of the potential SM user -- the soldier's age, education, pay grade, Military Occupational Specialty (MOS), length of service, time in current MOS and stated intention to reenlist at the end of his or her current term of service.

- Characteristics of the training environment -- the type and level of support given to the training system in the soldiers' units, especially as it may influence SM usage.

- Characteristics of the SMs themselves -- the documents' physical characteristics, ease of use, comprehensibility, and the perceived usefulness and accuracy of the SMs for the soldiers' jobs.

These factors were examined in order to develop recommendations for improving the level of usage and for identifying areas of possible deficiency in the SM system.

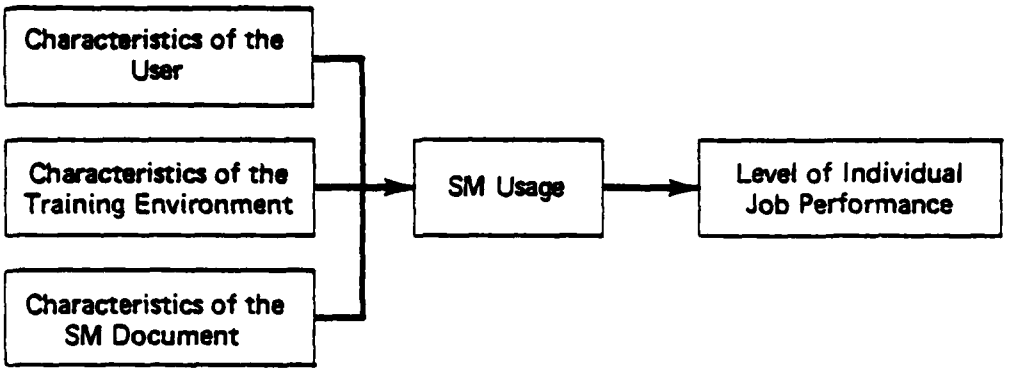
The third issue, the relationship between SM usage and the performance of soldiers in the field, is critical in terms of the long-term benefits of the SM approach to training and combat readiness. Performance was examined from two perspectives:

- The relationship between SM usage and the performance of individual soldiers on their SQTs, and

- The relationship between SM usage and the individual soldier's level of confidence in his or her ability to perform specific required tasks in his or her MOS.

Approach

The diagram on the following page shows the relationship between the various parts of the study. We wanted to find out the extent to which the characteristics of the potential SM user, the training environment, and the SM documents themselves affected SM usage; and how SM usage, in turn, affected individual job performance.



Data were collected from 1224 U.S. Army enlisted personnel in the United States (CONUS Sample, N=806) and Europe (USAREUR Sample, N-418). The data were obtained through personal interviews (N=353) and paper and pencil questionnaires (N=871). These personnel held specializations in 25 different combat and non-combat MOSs. Tables 1, 2, and 3 on the following pages summarize the salient characteristics of the sample from which the data were drawn.

Information was also obtained from approximately 200 interviews with senior level personnel in which their opinions and comments about the SM, its use, and its effectiveness, were solicited.

Organization of the Report

This summary report is organized according to the major issues addressed in the study. Section 2 focuses on the level and type of SM usage found in the sample, broken down by School, MOS, and assignment area (CONUS or USAREUR). Section 3 discusses the factors that influence SM usage: user characteristics, training environment and the SM document itself. Section 4 discusses the linkage between SM usage and individual performance.

Each section contains a summary and discussion of the major findings. The final section, Section 5, summarizes the recommendations drawn directly from the findings.

TABLE 1

Numbers of Soldiers Surveyed by Site

Site	Questionnaire N	Interview N	Total N	Percent of Total
CONUS	563	243	806	65.8
Stewart	199	77	276	22.5
Bragg	103	68	171	14.0
Campbell	261	98	359	29.3
USAREUR	308	110	418	34.2
Wiesbaden	56	20	76	6.2
Baumhoelder	130	36	166	13.6
Wackernheim	47	11	58	4.7
Bad Kreuznach	33	19	52	4.2
Zweibruecken	8	4	12	1.0
Landstuhl	8	0	8	0.7
Pirmasens	3	1	4	0.3
Mannheim	21	10	31	2.5
Finthen	2	9	11	0.9
TOTAL	871	353	1,224	100.0

TABLE 2
Numbers of Soldiers Surveyed by MOS

MOS	Title	N	Percentage
11B	Infantryman	78	6.4
11C	Indirect Fire Infantryman	83	6.8
19/11D	Armor Reconnaissance Specialist	40	3.3
19/11E	Armor Crewman	30	2.5
13B	Cannon Crewman	91	7.4
13E	Cannon Fire Direction Specialist	64	5.2
16P	Short-Range Air Defense Artillery Missile Crewman	66	5.4
16R	Short-Range Air Denfense Artillery Crewman	95	7.8
45K	Tank Turret Repairman	31	2.5
45L	Artillery Repairman	13	1.1
57H	Terminal Operations Coordinator	32	2.6
63B	Wheel Vehicle Mechanic	51	4.2
63C	Track Vehicle Mechanic	38	3.1
63H	Automotive Repairman	51	4.2
64C	Motor Transport Operator	52	4.2
71P	Flight Operations Coordinator	42	3.4
74D	Computer/Machine Operator	26	2.1
74F	Programmer/Analyst	6	0.5
76J	Medical Supply Specialist	29	2.4
76P	Stock Control Supplyman	44	3.6
76Y	Unit and Organization Supplyman	61	5.0
93H	Air Traffic Control Tower Operator	42	3.4
93J	ATC Radar Controller	47	3.8
95B	Military Police	61	5.0
95C	Correctional Specialist	47	3.8
---	Other	4	0.3
	TOTAL	1,224	

TABLE 3
Numbers of Soldiers Surveyed by Proponent Schools

School	Location	Relevant MOS	N	Percentage
Infantry	Ft. Benning	11B, 11C	161	13.2
Armor	Ft. Knox	19/11D, 19/11E	70	11.1
Artillery	Ft. Sill	13B, 13E	155	12.6
Air Defense	Ft. Bliss	16P, 16R	161	13.2
Ordnance	Aberdeen	45K, 45L, 63B, 63C, 63H	184	15.1
Transportation	Ft. Eustis	57H, 64C	84	6.8
Aviation	Ft. Rucker	71P, 93H, 93J	131	10.6
Admincen	Ft. Benjamin Harrison	74D, 74F	32	2.6
Health Science	Ft. Sam Houston	76J	29	2.4
Quartermaster	Ft. Lee	76P, 76Y	105	8.6
Military Police	Ft. McClellan	95B, 95C	108	8.8

SECTION 2

PATTERNS OF SOLDIER'S MANUAL USAGE*

Summary of Major Findings

1. There is broad variation in the level of reported SM usage among Schools and MOSs and between U.S.- and European-based personnel.

2. SM usage is much greater among combat personnel and MPs when compared to all other non-combat personnel.

3. SM usage increases in frequency and intensity with pay grade/rank.

4. SM usage is primarily associated with preparation for the SQT.

5. Combat personnel are more likely to use the SM for non-SQT related purposes than non-combat personnel.

Discussion

The overall level of SM usage within the sample was quite high; 82 percent of all soldiers interviewed or surveyed (N=1224) indicated that they had used the SM at least once in some fashion. However, within the sample we noted wide variations in use, ranging from a high of 100 percent in the case of the 13E MOS (Cannon Fire Direction Specialist, N=64), to a low of 31 percent in the case of the 57H MOS (Terminal Operations Coordinator, N=32). Figure 1 illustrates the different level of SM use grouped by the 11 Proponent Schools contained in the study.

Variations in use by MOS tended to reflect the overall School distributions. For example, within the highest use School, Artillery, the two MOSs examined, 13B and 13E had usage rates of 95 and 100 percent respectively. Within the lowest use School, Transportation, the two MOSs examined, 57H and 64C had use rates of 31 and 54 percent respectively.

A larger percentage of persons in the USAREUR sample tended to use the SM than persons in the CONUS sample (88 percent to 79 percent). Moreover, there is a clear difference in the level of use between combat arms and non-combat/support Schools.

*All of these data on usage are reported usage, not observed usage. These figures are generally much higher than the level of usage estimated by senior level personnel.

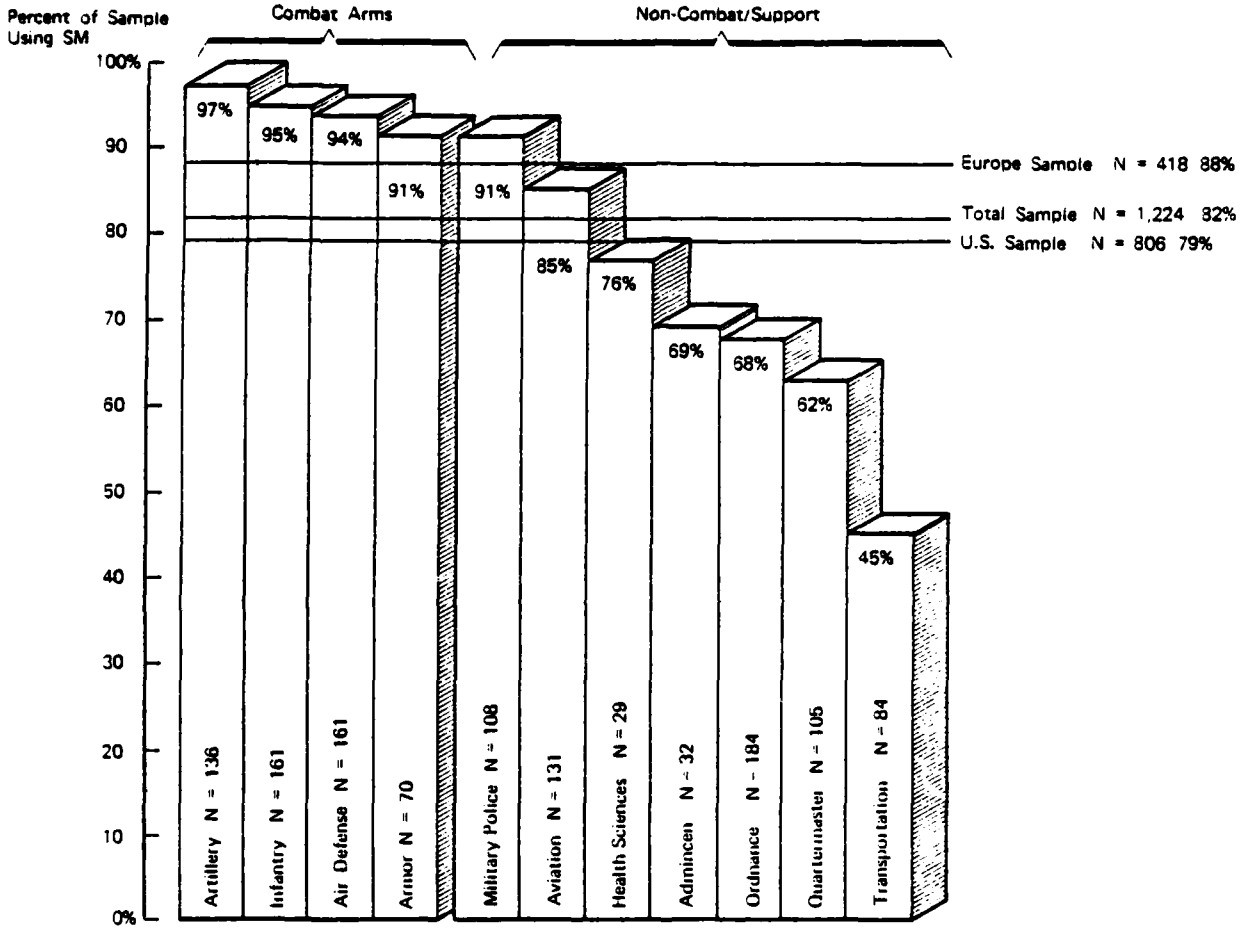


Figure 1. Percentage of personnel using Soldier's Manual, by Proponent School.

A second area of variation is by pay grade. In general, the higher the pay grade of the person the more likely he or she is to have reported using the SM at some time. Figure 2 illustrates this general pattern.*

Types of SM Use

Four types of SM usage were examined in detail:

- Use relating to preparation to take the SQT;
- Use relating to training on Common Soldier Tasks (CST);
- Use relating to the reference function of the SM (i.e., citations to other training and procedural documents included in the SM);
- Other uses such as a job aid, a general authority for correct procedures, or a guide to training others.

Since the SM was designed to be an integral part of the EPMS system, the SM's role in that area was given the most attention. As might be expected, we found that the SM is primarily used by soldiers to help them prepare for the SQT. Figure 3 on the following page illustrates the level of SQT-related use by Proponent School. As we found regarding overall SM usage, soldiers from combat arms Schools were somewhat more likely to use the SM for SQT preparation than soldiers from non-combat/support Schools. The overall level of usage for this purpose was 81 percent for our sample.

A surprisingly high proportion of the soldiers in our sample used the SM as a guide to Common Soldier Tasks (CST) and to other training and procedural documents. The percentage of use under these two categories were 74 and 80 percent, respectively. Figures 4 and 5 depict the level of reported usage in these areas by Proponent School. Again, the combat arms tended to use the SM for these purposes more than the non-combat arms, with notable variations. In general, the soldiers in the sample rated their SM quite high in terms of its usefulness as a guide to CST. With respect to the use of the SM as a reference to other training documents, the soldiers reported that their frequency of use was quite low. The average soldier reported using the SM for this purpose only "once or a few times."

*There were only 19 E-7s in the study. Since this number is too small to produce valid results, these data are not included in the findings.

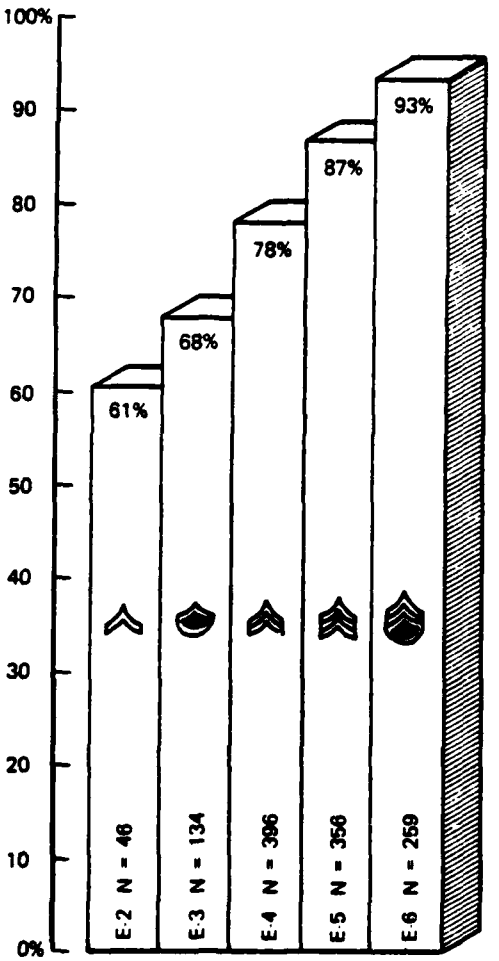


Figure 2. Percentage of personnel using Soldier's Manual, by pay grade.

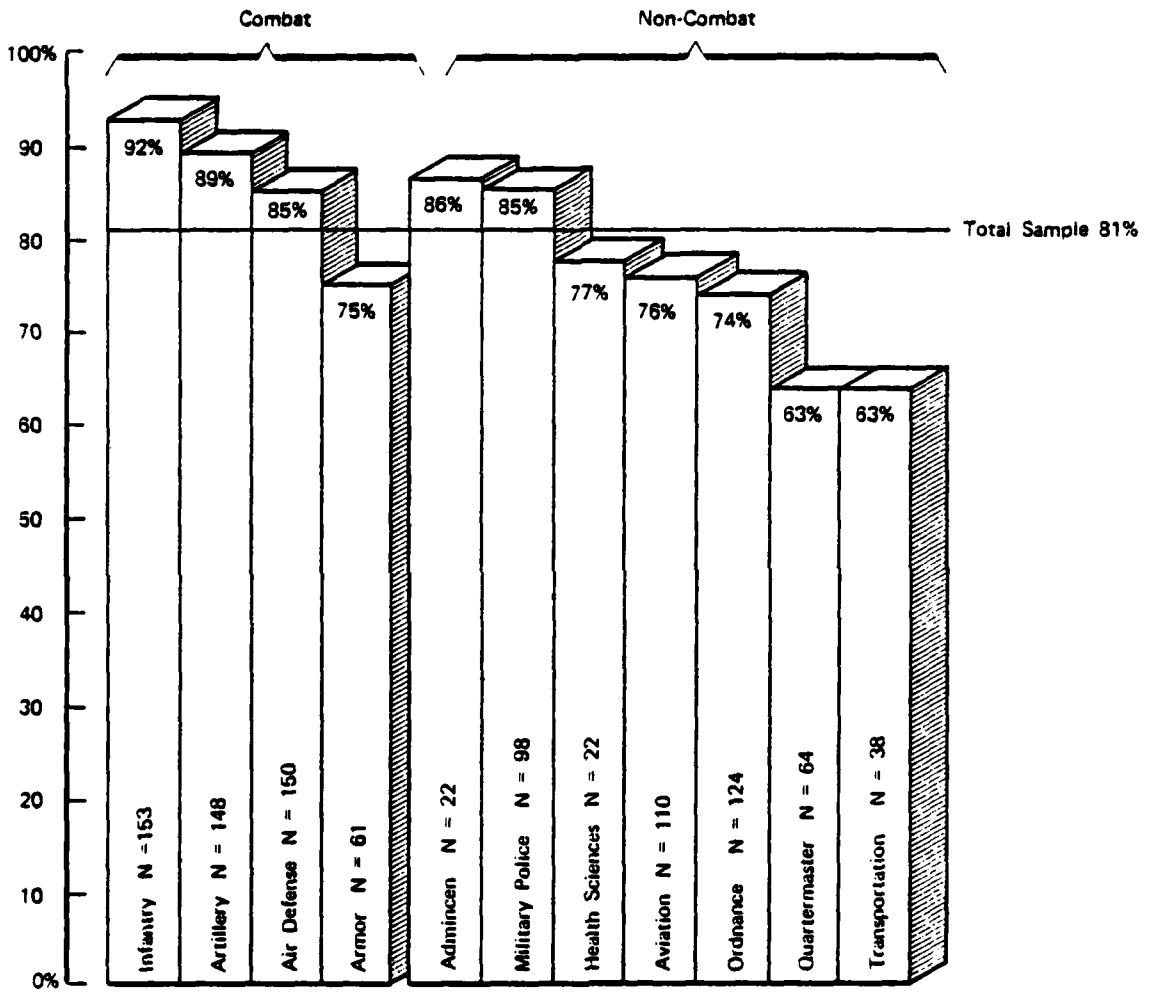


Figure 3. Percentage of SM users who use SM for SQT preparation, by Proponent School.

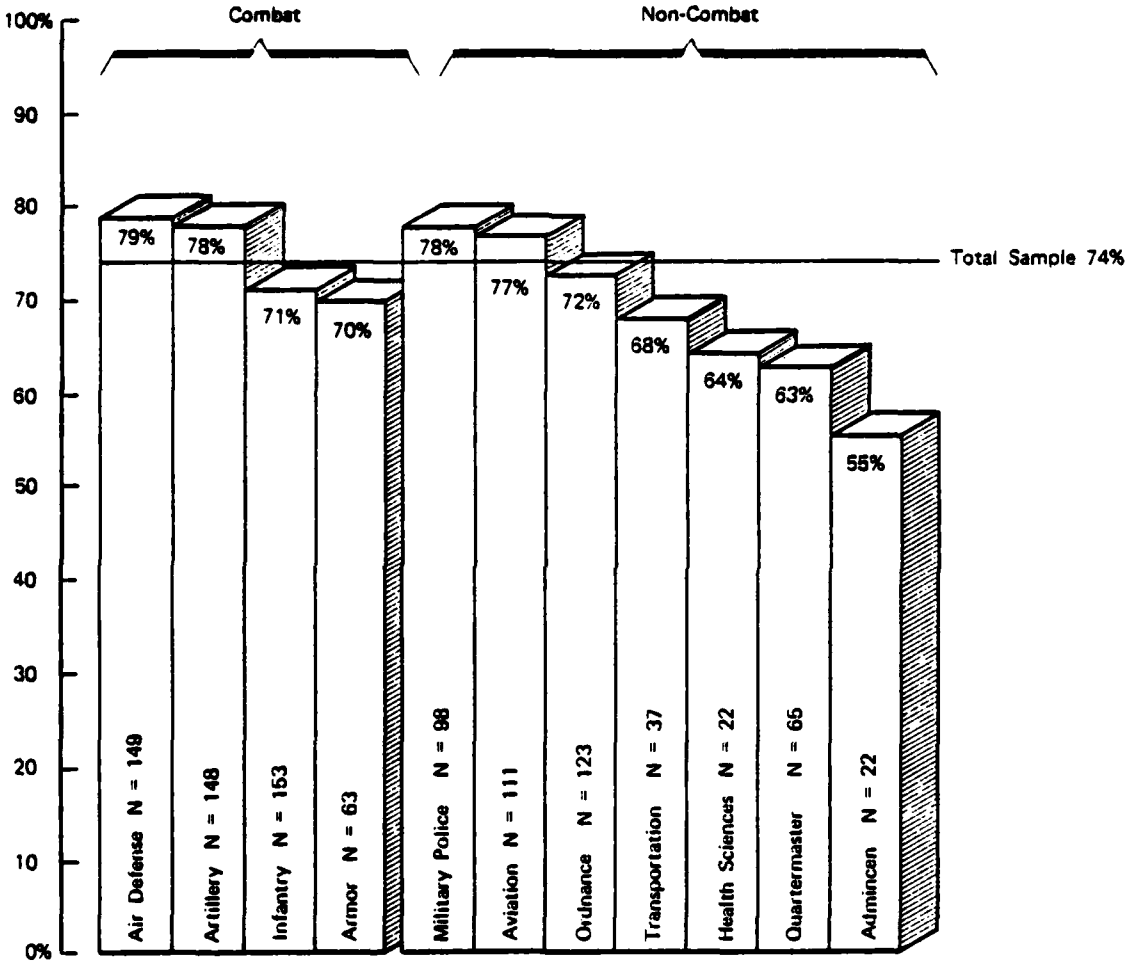


Figure 4. Percentage of SM users who use SM as a reference to Common Soldier Tasks (CST), by Proponent School.

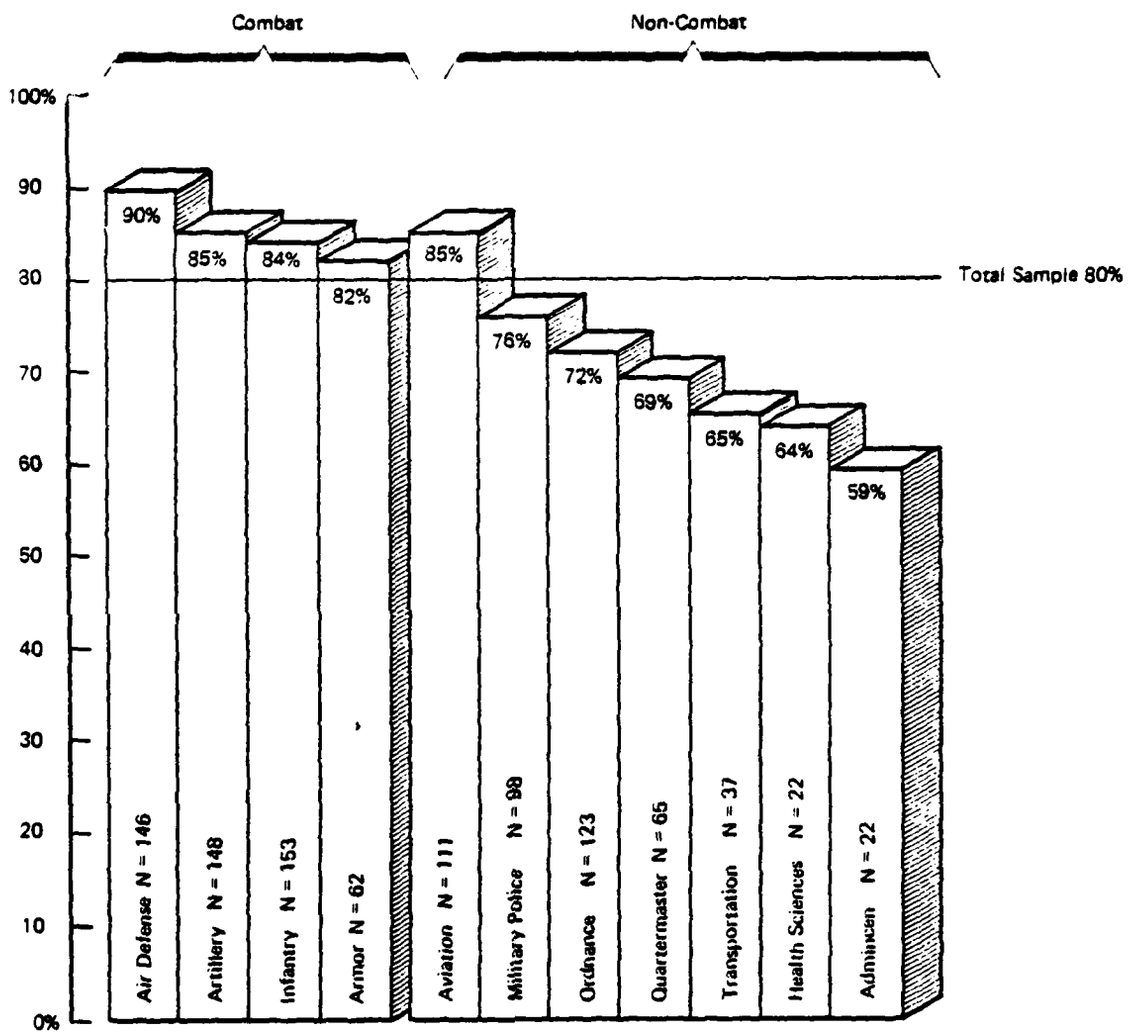


Figure 5. Percentage of SM users who use SM as a reference to other training or procedural documents, by Proponent School.

While these figures suggest an impressive level of use of the SM among the soldiers in our sample, it is clear that much of the corollary use of the SM is still closely tied to the SQT. We asked the soldiers in our sample if they ever used the SM for tasks other than those included in the SQT Notices. The responses, shown in Figure 6, indicate that this kind of usage is much less common.

Variation by Rank. A consistent pattern in all the usage data is that SM use in general, and most specific forms of use (SQT preparation, CST, reference, etc.) increases as the rank of the soldier increases. Figure 7 illustrates this pattern. The category "other" uses includes using the SM to train others, settle arguments, and as a job performance aid.

SQT Related Usage

As indicated earlier, the primary reason why soldiers use their SM is to prepare for the SQT. However, some of the data point to the possibility that once a soldier uses the SM for SQT preparation he is more likely to use it for other purposes as well. Figure 8 illustrates this point. Persons who had taken the SQT were much more likely to have used the SM than persons who had not. The figure indicates that among those who took the SQT, 90 percent had used the SM. By contrast, among those who had not yet taken the SQT, only 66 percent had used the SM. Of course, as noted above, the bulk of this usage was to prepare for the SQT itself.

The fact that a soldier said he or she used the SM to prepare for the SQT actually says very little about the extent of usage, which could vary from many hours of study over many weeks to a quick "thumb-through" a few hours before the test. In reality, we found that the intensity of reported use was quite high. The average soldier said he or she studied for his or her SQT over a period of about 2.2 months, with very little variation among Proponent Schools or MOSs.* During this period the average soldier used the SM between 6 to 10 hours per week. These aggregate findings obscure a critical fact about SM usage; that, in general, combat School MOSs used their SMs more often and for more hours per week than non-combat School MOSs. Since these findings are consistent with the general usage data, they establish a point of departure for a further examination of the reasons why the SM is or is not used.

*SQT Notices were often distributed to soldiers before the required 60 days prior to administering the SQT itself. This may account for this relatively high figure.

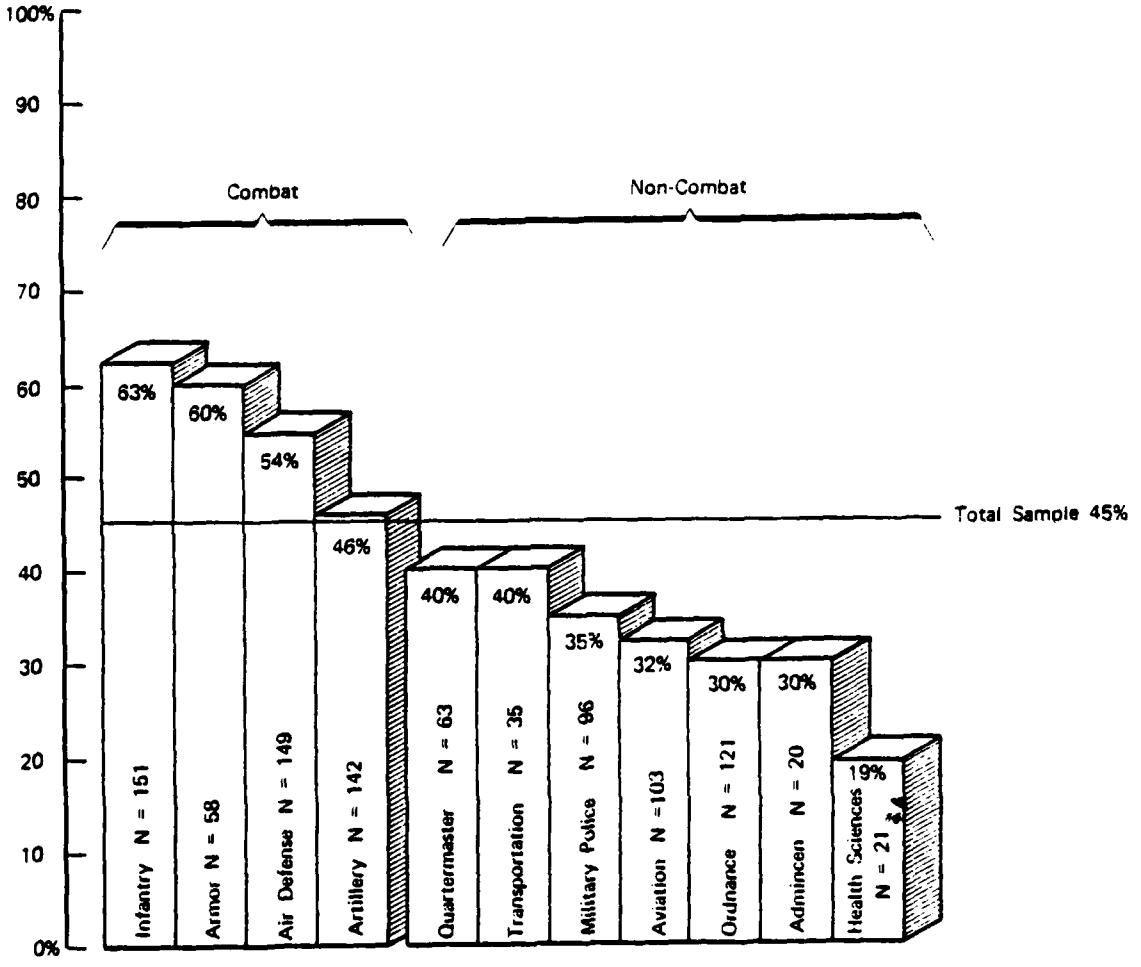


Figure 6. Percentage of SM users who use SM for non-SQT related tasks, by Proponent School.

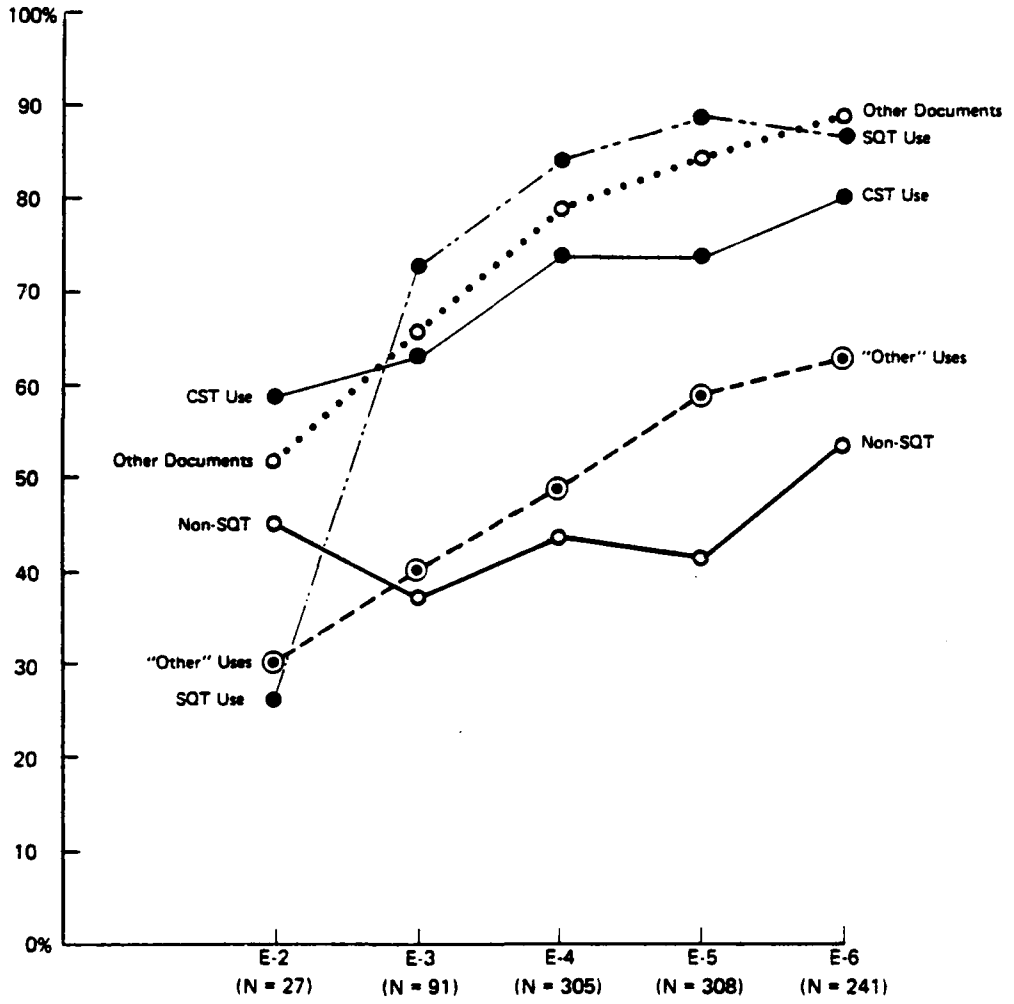


Figure 7. Percentage of SM users using SM for specific purposes, by pay grade.

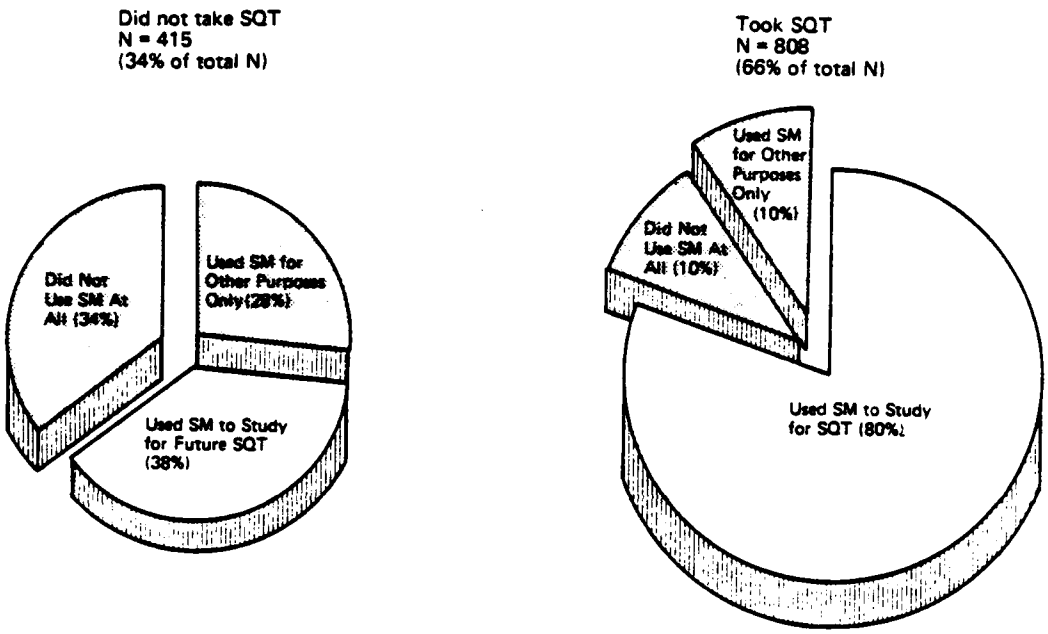


Figure 8. Percentage of soldiers using SM, by whether soldier had taken SQT.

The Usage Index

To provide a general measure of SM usage a single statistical indicator called the usage index was developed. The usage index is a composite measure of several individual indicators of SM use:

- How often the SM was used, per month and per week,
- The number and purpose of uses to which the SM was put, and
- The extent to which the usage was voluntary or required by the soldiers' supervisors.

The index was validated through successive inter-variable correlations to produce a consistent and scaleable index of use. The index varies from a high of "11" (high level and intensity of use) to a low of "0" (little or no use). This index is used in subsequent sections of the report to show how usage relates to performance measures.

Summary and Implications

The initial findings of the study are reassuring to the extent that they show the SM is not being ignored and that soldiers are using it for most of the purposes for which it was designed. The fact that the SM is being used primarily to prepare soldiers for the SQT is expected and, from the standpoint of the overall purpose of the SM, not necessarily an undesirable fact. However, some questions need further clarification.

- Why is the level and intensity of use higher among combat than non-combat soldiers?
- What factors lead to specific differences in the level and intensity of use?
- To what extent is SM usage motivated by the individual soldier's desire to do a better job, versus his or her need to meet certain mandated requirements?

These issues are addressed in the next section.

SECTION 3

FACTORS RELATING TO SM USAGE

Summary of Major Findings

As noted, three sets of factors thought to be related to SM usage were explored:

- Characteristics of potential SM users,
- Characteristics of the training environment, and
- Characteristics of the SM documents themselves.

The principle findings relating to each of these sets of factors were:

1. The greater the individual soldier's level of Army experience, the greater is his or her use of the SM.
2. Greater individual Army experience is related to a greater level of voluntary (versus required) use of the SM to prepare for the SQT, and a more frequent use of the SM for that purpose.
3. Greater Army experience is related to a greater use of the SM as a reference to other training documents.
4. The individual soldier's reported attitude toward the Army, his or her job, and intentions to remain in the service is not related to the level of SM usage.
5. The greater the level of opportunity, support, and encouragement to use the SM a soldier experiences, the more likely he or she is to use the SM.
6. Few significant problems were reported relating to the characteristics of the SM documents as a whole; however, specific problems with certain SMs were found that may be related to lower levels of usage.

Discussion

The data indicate a convincing relationship between SM usage and a soldier's level of experience in the Army. This finding is consistent with the finding we reported earlier relating to the increased level of usage as pay grade increased. Factors within the "experience" group included: soldiers' rank, skill level, time in the Army, and time in MOS. An additional relationship between the soldiers' age and SM usage has been interpreted to reflect this "experience" factor. In general, these experience

factors relate positively to the probability that a soldier will use the SM to prepare for the SQT, use the SM as a guide to Common Soldiers Tasks and other training documents, and use the SM for other non-SQT-related purposes. Moreover, "experience" was found to increase the probability that a soldier would study for the SQT over a longer period, more often and for a greater number of hours per week. Finally, we found that experience tended to relate to a greater level of independent, voluntary study of the SM.

We originally hypothesized that SM usage would be related to the soldier's overall attitude toward his or her job and the Army in general. The data do not support this assumption. In general, the extent to which the soldier liked his or her job, the intention to remain in his or her MOS and the amount of time left before the end of his or her current enlistment were found to be unrelated to the level of SM usage. However, the soldiers' reported intention to reenlist was found to correlate moderately (.16) with his or her usage level.

A more potent set of factors was the overall training environment in which a soldier found himself or herself. Factors such as whether the soldier had been given help on the use of the SM, had received help on how to use the SQT Notice, and saw that help as being useful, were found to be strongly related to SM usage. In addition, if the soldier was receiving Individual Job Training (IJT) in his or her MOS, and was tested on IJT-related tasks in the SQT, SM usage tended to be higher. Finally, we found a modest relationship between the level of SM usage and the extent to which the soldier felt he or she had enough time to prepare for the SQT. In general, factors such as whether necessary equipment or documents were available to study, and whether the soldier received IJT on tasks unrelated to his or her MOS, were found to have very little connection to SM usage.

The kind of support and encouragement to use the SM experienced by the soldiers in our sample differed greatly, and this difference goes part of the way in explaining why there were differences between combat and non-combat MOSs in the level of SM usage. In general, most soldiers who used the SM did so on their own volition and on their own time. However, within the combat MOSs this use was supplemented with supervisor-directed use and a certain amount of scheduled use. In general, these mandated periods of use were far less common among the non-combat MOSs. The fact that our overall usage index correlated highly with both supervisor-directed and scheduled SM use patterns comes as no great suprise. What does suprise (and concern) us, however, is the fact that despite a generally higher level of directed use there was so little real difference in independent SM usage between combat and non-combat soldiers. Thus, in the absence of directed usage it may well be that the difference in level of SM usage between combat and non-combat soldiers would be much smaller.

The Characteristics of the SM Documents

The final set of factors relating to SM usage relates to the SM documents themselves. Ideally, these documents should be seen as accurate, useful, and useable by all soldiers. In reviewing the characteristics of the SM documents we focused on five aspects of the SM:

- their physical characteristics;
- how easy they are to use;
- how comprehensible they are to the typical user;
- the clarity and perceived job relatedness of the test sections of the SM; and
- how well they reflected the soldiers' job.

The principle problem we found with the physical characteristics of the SM was with the way they are put together. Many of the volumes tended to come apart with even moderately rough use, and in many instances they became unsuitable for use in the field or in the shop. This was the result of the way the manuals were bound (primarily with glue and staples). Given the bulk of many of these volumes this makes it difficult for soldiers to lay the volumes flat without breaking the binding or taking the manual apart. Beyond these problems we found relatively few complaints about the physical characteristics of the volumes themselves -- their size, bulk, and print legibility. Those soldiers who did have complaints tended to say that the volumes were too large (14%), too bulky (17%), or too thick and heavy (15%). Most of these complaints came from the infantry MOSs (11B and 11C), whereas the binding problem was mentioned across the board.

Another important aspect of the SMs is their comprehensibility -- how easy they are for the typical soldier to read and understand. We asked soldiers six questions in this area:

- Is the purpose of the SM clearly stated?
- Is how to use the SM clearly stated?
- Are tasks easy to find in the SM?
- Are tasks grouped appropriately?
- Are the words in the SM job-related?
- Are the words in the SM easy to understand?

In general, the answer to each of these questions was "yes." The most frequently mentioned problem was with the terminology used in the manuals, which 16 percent of the soldiers said was not always job-related. Within specific MOSs a number of these problem areas were documented. For example, in the 13E (Artillery) MOS, 23 percent of the respondents complained of difficulty in finding specific tasks in their SM and 20 percent complained about the way tasks were grouped in the text. This SM happened to be one of the larger volumes in the series we reviewed (over 200 pages). Similar problems were reported in the 76J (Health Science) MOS. The lack of job-related terminology was a particular problem for soldiers in 63C (Ordnance) MOS, the 76J MOS, both MOSs under the Quartermaster School (76P and 76Y) and the 95B (Military Police) MOS. We also found that lower-ranking (and thus, less-experienced) soldiers more often reported difficulty with the terminology in the SMs than higher ranking personnel.

A more interesting, and potentially more important finding, is that more soldiers who used the SM for other than SQT-related study (i.e., job aid, training, etc.) reported problems with the terminology in the SM than did those who used it for SQT preparation.

The only MOS in which a sizeable number of soldiers reported a problem understanding the words in the SM was the 76Y (Quartermaster) MOS (24%). This result was suprising, because an independent analysis revealed a significant gap between the computed reading level in many of the SMs and the average reading ability of typical soldiers. Perhaps individuals are reluctant to admit that they have difficulty in understanding what they read or they do not realize that they have such difficulties.

Test-Related Materials. A section of each SM lays out the test standards, conditions and performance measures for each of the tasks described in the volume. To be of maximum use, these test-related materials must be clear and specific and, more importantly, related to the jobs the soldier actually performs. Unfortunately, our findings suggest a significant problem in both of these areas. Overall, 16 percent of our sample indicated that the test standards, conditions, and measures in their SM were unclear, and 21 percent felt that "some," "few," or "none" of them were related to their actual jobs. Within specific MOSs these problems appear to be particularly acute, as shown in Figure 9. In general, these complaints were most prevalent in the non-combat MOSs, particularly those under the Health Sciences, Admincen, and Quartermaster Proponent Schools.

The SM and the Job. The logic of the SM system requires that the SM reflect the actual job-related requirements of each MOS. Our review of this important aspect of the SM focused on five specific questions:

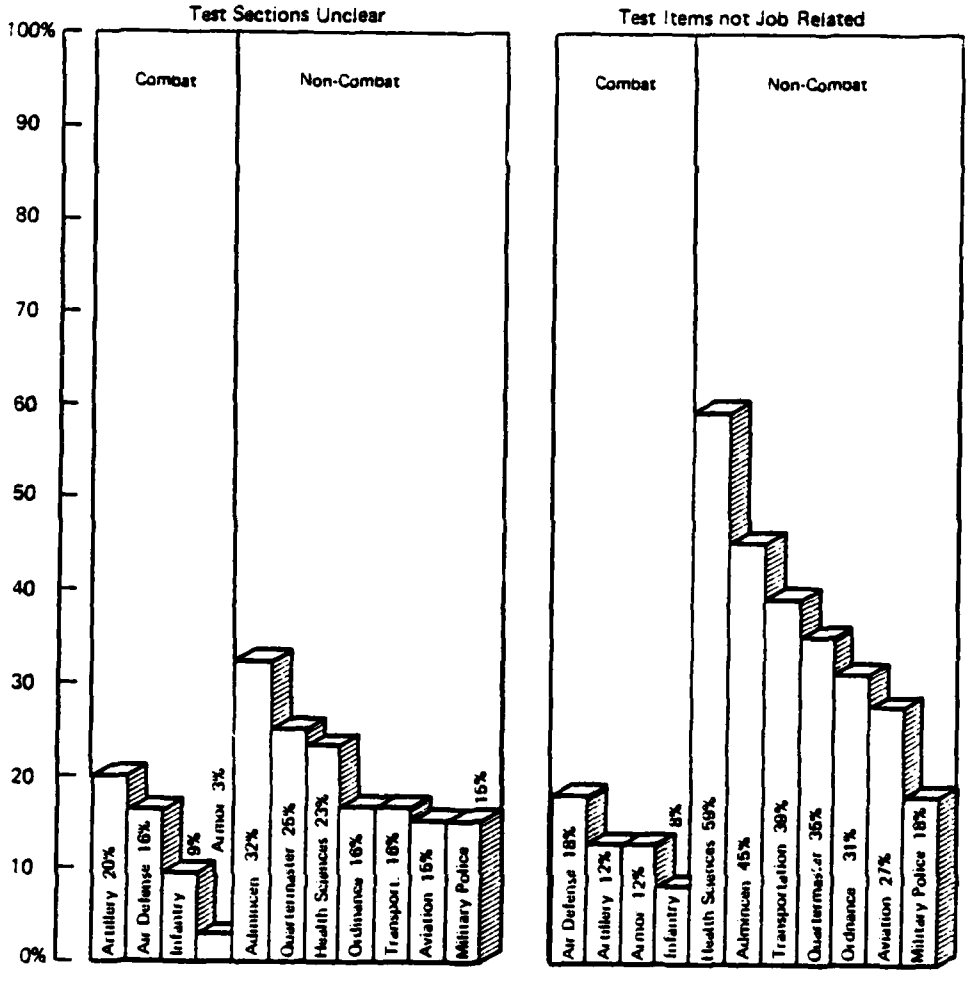


Figure 9. Percentage of SM users rating test material unclear or not job related.

- Does the SM tell the soldier everything he or she needs to know to perform the tasks in the MOS and Skill Level?

- Does the SM cover the tasks that are critical to the soldier's job?

- Are any important tasks left out of the SM?

- Are the tasks in the SM different from those the soldier actually performed on the job?

- Are there any technical errors in the SM?

Figure 10 summarizes the responses of our sample to these questions. The figure shows that a substantial percentage of the sample felt that the SM does not adequately tell the soldier how to do his job, describes tasks which are different from those actually performed on the job and contains significant technical errors. A lesser percentage of respondents reported problems with the criticality of the tasks described in the SM and with the omission of important tasks from the SM.

Figures 11 to 15 break these responses down by Proponent School. With a few notable exceptions the complaints about the job-relevance of the SM are fairly evenly spread among all Schools and MOSs, although the combat Schools had slightly fewer problems than soldiers in non-combat Schools.
Within specific problem areas we noted that:

- soldiers in the Admincen School were more likely to complain that the tasks described in their SMs were not critical to their jobs;

- soldiers in the Aviation MOSs were critical of the lack of detail concerning how to do their jobs and of the absence of certain important tasks in their SM;

- soldiers in all Schools and MOSs frequently reported that the tasks described in their SMs were different from those they performed on the job;

- infantry MOS were consistently less critical of the job-relatedness of their SM than other soldiers;

- combat MOSs were generally more likely to identify errors in their SMs than non-combat soldiers.

In general, complaints about the difference between the tasks actually performed and those described, and technical errors in the SM, increased with the rank of our respondents.

(text continued on p. 31)

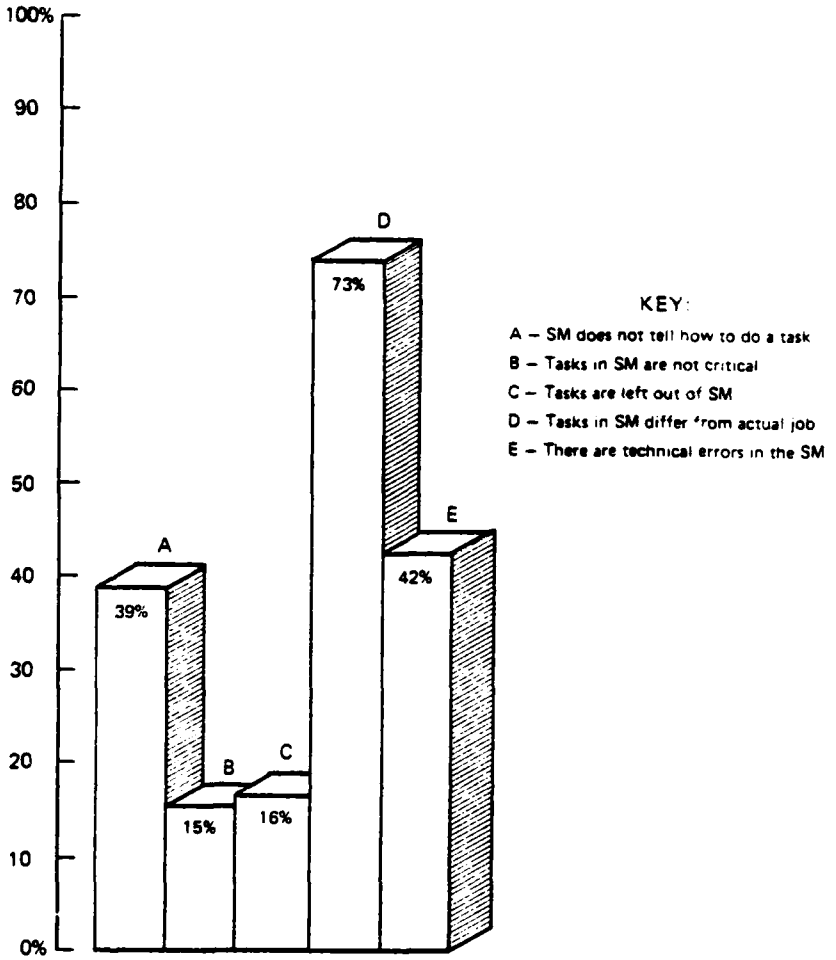


Figure 10. Percentage of SM users reporting job-related problems in the SM.

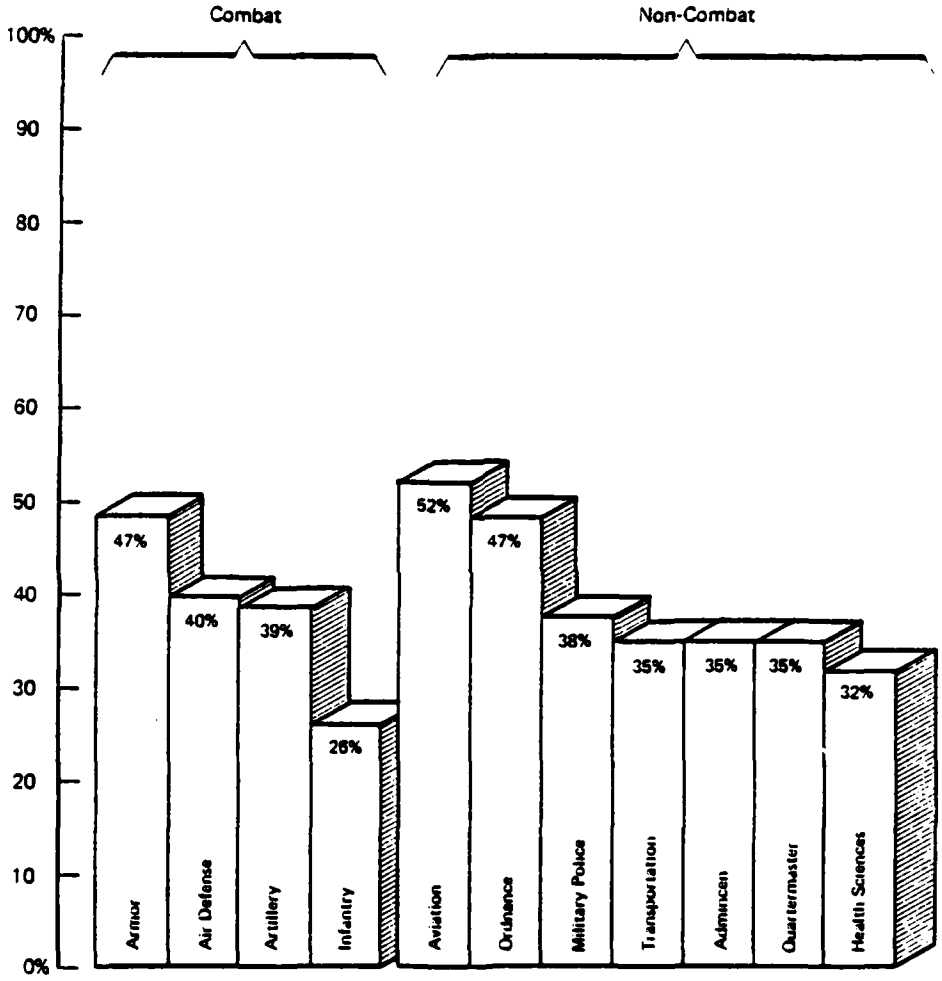


Figure 11. Percentage of SM users reporting that SM does not tell how to perform job, by Proponent School.

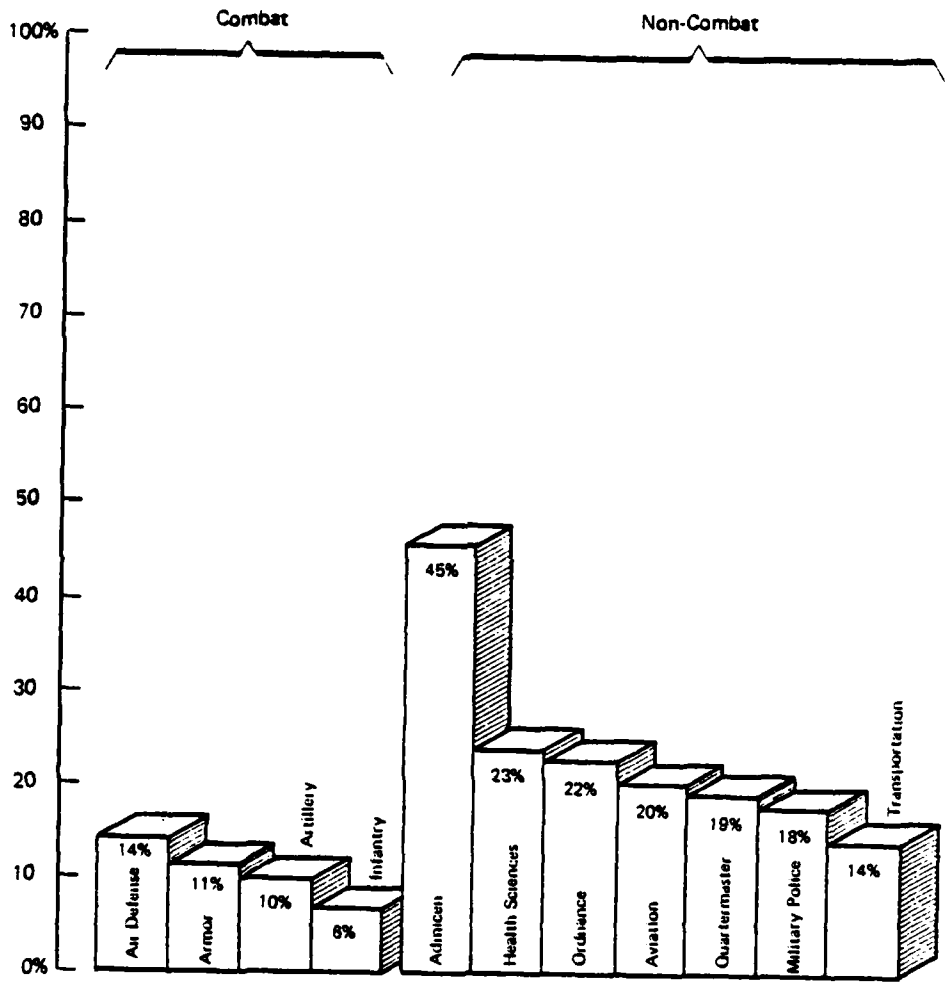


Figure 12. Percentage of SM users reporting that tasks in SM are not critical to their job, by Proponent School.

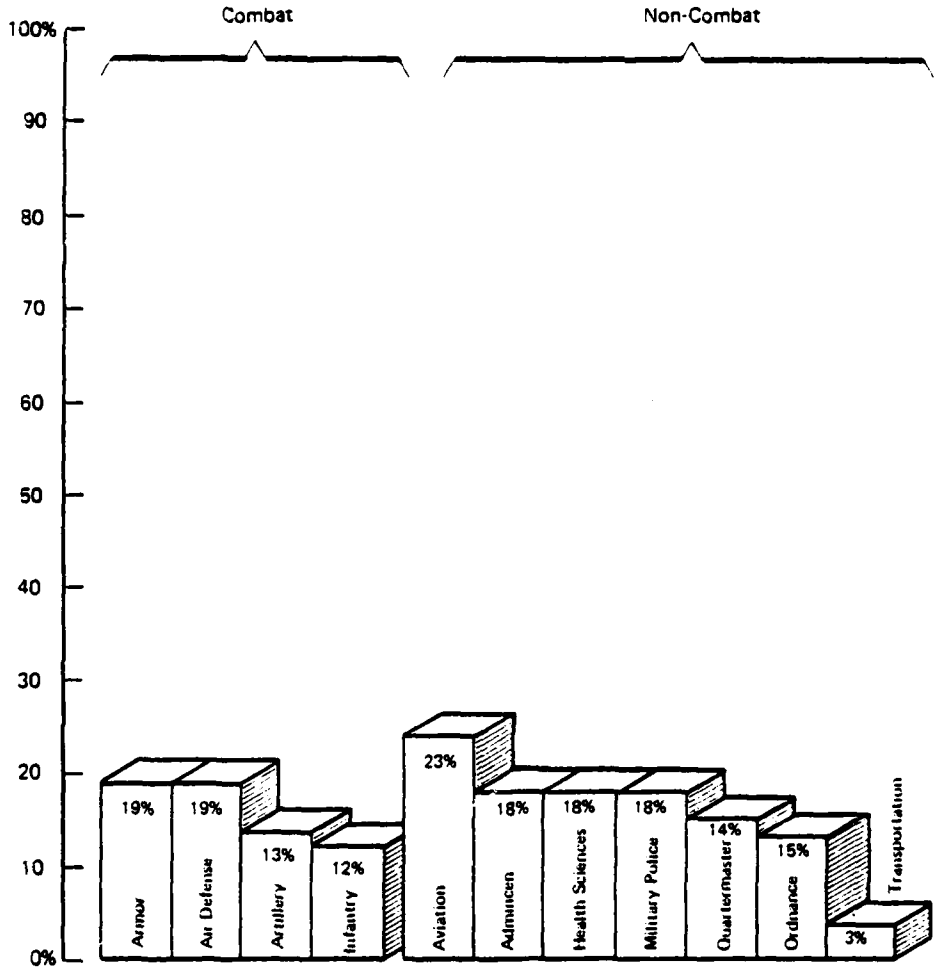


Figure 13. Percentage of SM users reporting tasks left out of SM, by Proponent School.

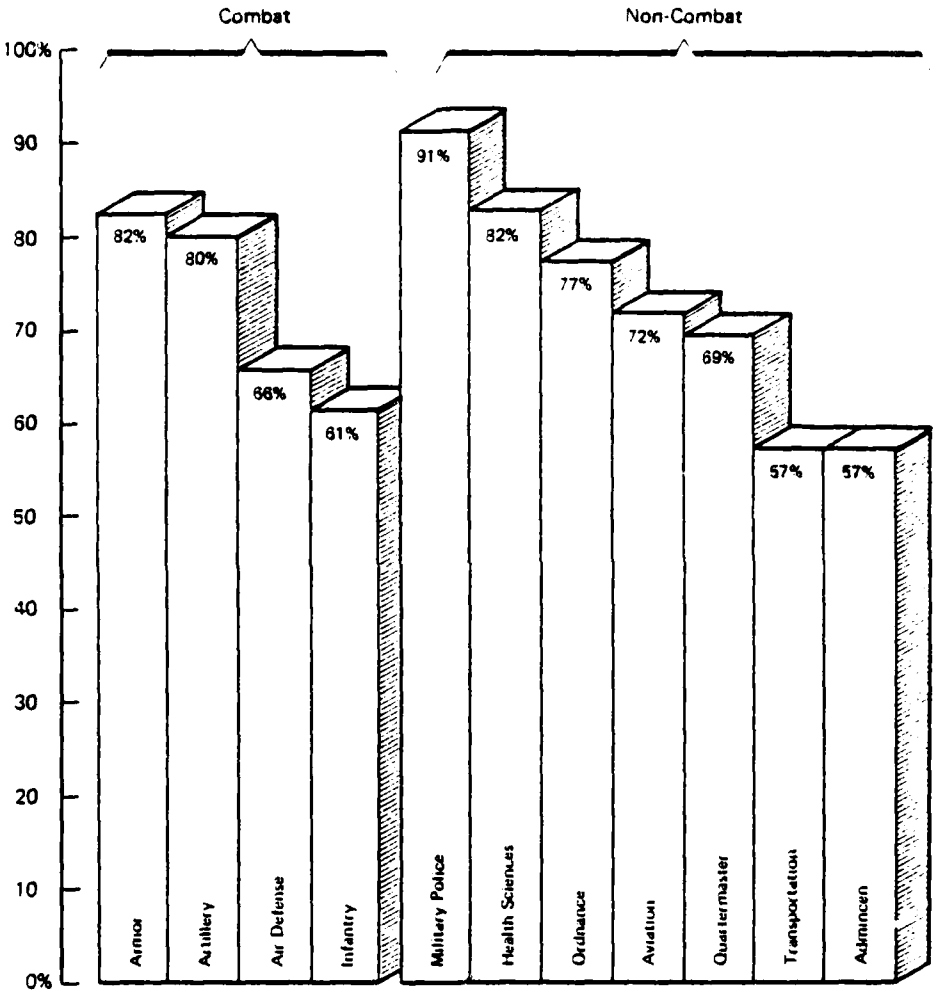


Figure 14. Percentage of SM users reporting that tasks in SM differ from actual job, by Proponent School.

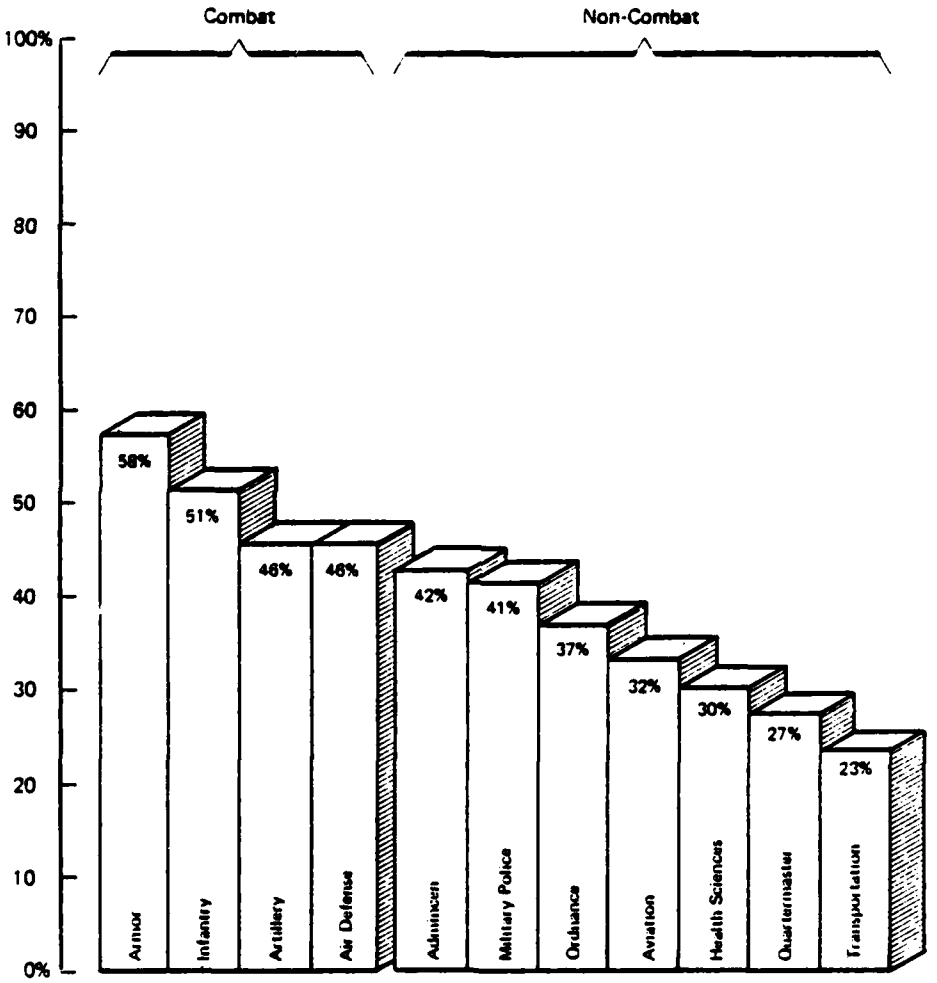


Figure 15. Percentage of SM users reporting technical errors in the SM, by Proponent School.

We could find no pattern of response according to whether or not the soldiers had used the SM to prepare for their SQT.

Summary and Implications

Our analysis of the factors related to SM usage can be summarized as follows:

- The demographic characteristic which exerts the greatest influence on whether or not a soldier uses the SM is level of experience in the Army -- the greater the level of experience the more likely he or she is to use the SM.

- The most important aspects of the training environment which influences the level of SM usage are the SQT system, which virtually dictates the need to use the SM, and the level of support, encouragement, and opportunity given to the soldier to use the SM.

- A detailed analysis of the characteristics of the SM documents themselves pointed to several potentially serious problems which are likely to reduce the level of SM usage, especially for purposes other than SQT preparation; primarily, a perceived lack of relevance of the SM to the soldiers' jobs and a perceived lack of relationship between test standards, conditions, and performance and the actual job.

The influence of the three sets of factors, i.e., individual characteristics, training environment characteristics and the SM documents themselves, are obviously related and mutually reinforcing. Two (not mutually exclusive) scenarios can be constructed to describe how and why the SM is used or not used, based on these findings:

- Advancement is important to most soldiers, and becomes more important the longer the soldier serves and the higher he or she advances. Insofar as the SQT represents an important advancement requirement, a "device" such as the SM becomes a valuable tool toward that end, particularly since the SM and SQT are so closely intertwined.

- A combat soldier's 'job' during peacetime is primarily training so that, when the need arises, he or she can perform his or her real job -- combat operations. By contrast, the non-combat soldier, in most instances, is doing his or her real job every day. For the combat soldier, the SM

represents an integral part of the training environment and thus, that soldier is more likely to use the SM and to be required to do so by his or her supervisors and superiors. For the non-combat soldier the SM is primarily seen as an aid to passing the SQT. Only secondarily is it seen as a tool to be used on the job, and then only insofar as it offers a practical way to solve a real problem. This distinction may also explain why non-combat soldiers were generally more critical of the SM documents than combat soldiers. Combat soldiers are evaluated on how well they can replicate the procedures and doctrines outlined in the SM. Non-combat soldiers are more likly to be evaluated on how well they get their job done, which they do every day, whether it is "by the book" or not.

Without belaboring the point, the data presents a potential problem for the SM system in that there is evidence that the SM-SQT relationship has become or is becoming an additional requirement in the advancement system, especially for non-combat personnel, and may not be contributing as much as it should to the acquisition of necessary job skills. In the next section, we turn explicitly to that issue.

SECTION 4

SM USAGE AND EFFECTIVENESS

Summary of Major Findings

The final aspect of the SM evaluation was to determine whether SM usage contributed to improved job performance; that is, apart from any deficiencies in the extent or nature of SM use, is the SM an effective training device? We examined two indicators of effectiveness, the SQT and the soldiers' own appraisal of how well they could perform specific tasks covered in the SM. Our major finding is that all evidence points to a positive relationship between SM use and increased job performance. Because of limits in our research design we cannot establish the existence of this relationship with certainty, nor can we do more than estimate the magnitude of the effect. However, the evidence that exists points in the right direction and certainly adds confidence to the basic premise behind the SM document.

Discussion

The analysis of the relationship between SM usage (measured by the index) and the SQT was complicated by one salient fact: there are substantial differences among the various SQTs for different MOSs. That is, based on the evidence of the average SQT scores, some SQTs are harder to pass than others. In addition, some SQTs place greater weight on the physical, hands-on portion of the SQT than on the soldiers' ability to pass a written, paper and pencil test, and vice versa. Thus, in using the SQT as an indicator of effectiveness for an Army-wide sample we were combining a wide variety of testing procedures and levels of difficulty. Consequently, we were not suprised to find that the most important variable in explaining differences in SQT scores was the SQT test itself. That is, if you know what test a person took you can make a reasonable guess about his or her score. SM usage accounted for only 10 percent of the variation in overall SQT scores and made virtually no contribution to explaining either the written or the hands-on test component scores of our sample.

The solution to this problem is to treat each MOS as a unique domain. Figure 16 displays the scatterplot produced when the level of SM usage within an MOS is plotted against the average written SQT score of soldiers in the MOS. A simple "eyeball" examination of the scatterplot shows a relatively consistent positive relationship between SM usage and SQT scores. The actual statistical correlation represented in the figure is .657, when each MOS is treated as a single data point.

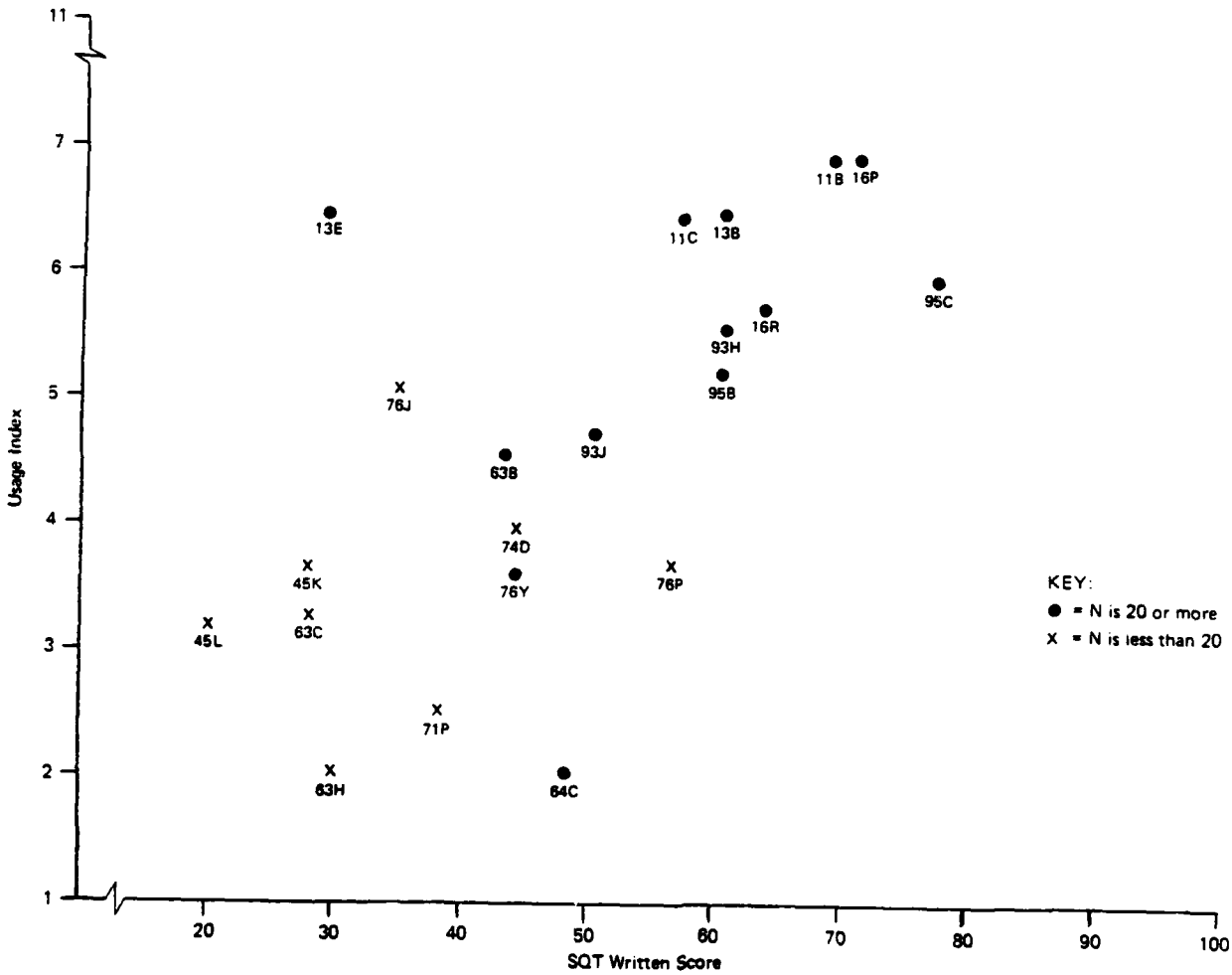


Figure 16. Usage Index and SQT Written scatterplot.

A second scatterplot, shown in Figure 17, plots the average hands-on SQT scores against the level of SM usage within each MOS. The correlation shown in this figure is smaller (r=.389) but also in the positive direction. (Hands-on scores tended to be consistently high, making it difficult to show any kind of relationship.)

SM Usage and Soldiers' Job Confidence. Soldiers in our sample were asked to review a list of tasks taken from their SM and answer three questions:

- Have you ever been trained for the task?
- Do you perform this task on the job?
- How confident are you in your ability to do the task? (Can't do it; Not very well; Fairly well; Well; Very well)

We told the soldiers that if they felt they could pass the SQT on the task they should answer "I can do it well." We found that there was a strong correlation among the answers on the three questions. That is, if a soldier was trained on a task or actually performed it on the job his rating of his ability to do the task was higher. We also found that the soldiers' confidence rating on a task correlated highly with whether the soldier had passed that same task on the SQT.

The scatterplot shown in Figure 18 shows the relationship between the usage index and the soldier's overall confidence rating on the tasks. The relationship is very strong (.755) using the average usage index for each MOS and the average confidence rating of the soldiers in the MOS as single data points.

Summary and Implications

The evidence of a relationship between SM usage and SQT scores is substantial. Even given the limitations of the data we can say that SM usage improves the chances that a soldier will do better on the SQT and that he will also feel more confident about his ability to do his job. One would therefore expect that if the SM itself was made a more effective document and its level and intensity of use were increased, increased ability to perform the tasks in the SM would result.

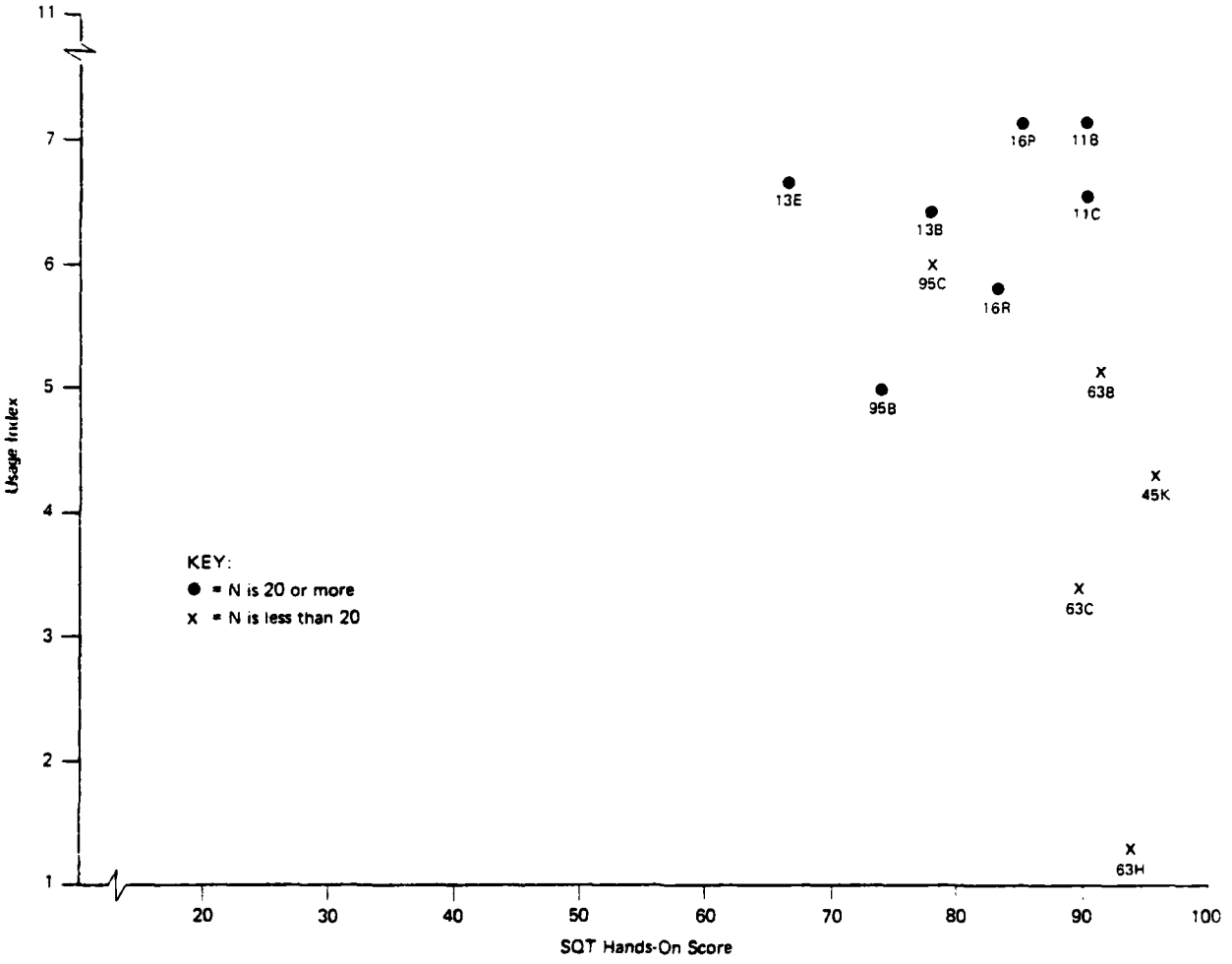


Figure 17. Usage Index and SQT Hands-on scatterplot.

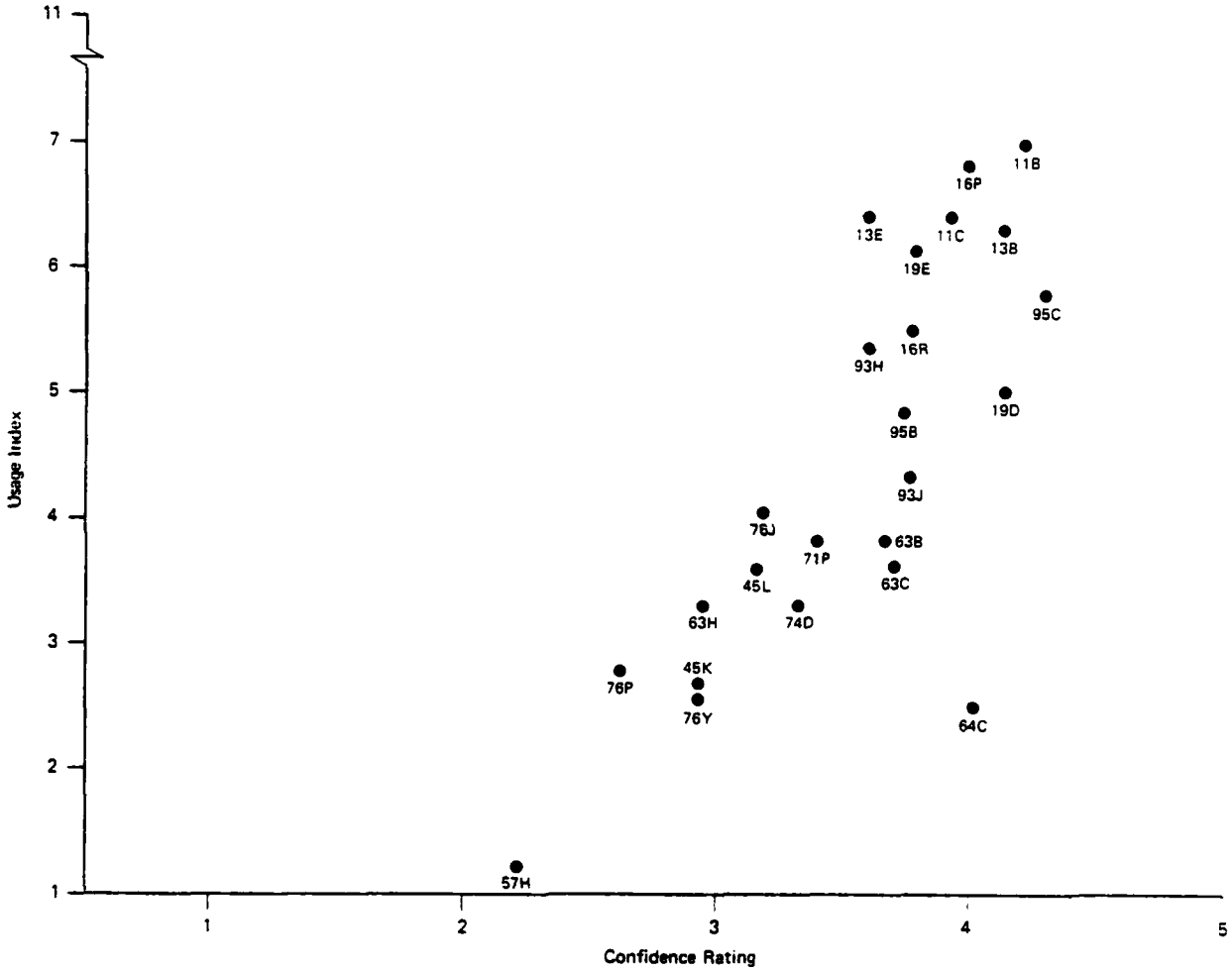


Figure 18. Usage Index and Confidence Rating scatterplot.

SECTION 5

GUIDELINES AND RECOMMENDATIONS

Introduction

Several points need to be kept in mind in connection with this section of the report:

1. The data for this study were collected in 1979. Although there have been changes in some SMs and SQTs since that time, there is no reason to believe that these changes would materially modify the nature of the results obtained. A study carried out by ARI in the latter part of 1980 on 11B and 13B SM use and effectiveness showed no substantial differences from the results obtained in 1979. We therefore feel confident that the recommendations made below are still valid.

2. Early versions of the technical report on this study, along with recommendations, were disseminated by ARI to Ft. Eustis and to all Proponent Schools in the fall of 1980, and comments solicited.

3. The underlying rationale of the study was to determine the conditions of use and the effectiveness of the SM as an individual training document and to recommend ways in which it could be made more effective. Since SM usage does seem to be related positively to self-confidence ratings and SQT scores, there is justification for taking a supportive posture in the following recommendations. Our message is: "The SM does work in a limited way and, with additional resources, could be made to work much better." The larger issues of benefits versus overall costs to support the SM or alternatives to the SM itself, are not within the scope of the study and must be addressed by those who have a broader perspective.

Document Characteristics

Physical Characteristics. To the extent that the Soldier's Manual serves its fundamental purposes as a personal job and skill manual, it will get very hard use. It would be ironic, indeed, if its very effectiveness led to its physical deterioration. The evidence from the study suggests that, as a class, SMs are not sturdy enough to withstand constant use, and especially not under field and/or shop conditions.

It is recommended, therefore, that the nature of the bindings used on SMs be re-examined, along with the related issue of number of pages. Possible approaches include:

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a. Remove Common Soldier Tasks from SMs that have them.

b. Consider a kind of binding that would allow the SM to lie flat.

c. Consider separating those manuals that have skill levels 10-40 bound together. Even skill levels 10 and 20 need not necessarily be bound together as presently directed by TRADOC.

These changes would require relatively small adjustments in the printing and binding of SMs and should involve only a modest increase in the cost per document. And yet, unless such changes are made, efforts to increase the use of the SM may be counter-productive.

Purpose, Completeness, and Job Relevance. These areas broach a variety of critical issues related to the usefulness of the Soldier's Manual as an individual job, training and test support document.

Reviewing the content of SMs and examining the data obtained in the study leads to one inescapable conclusion. Neither the intended nor the perceived purpose of the SM is clearly understood and agreed upon by those who produce them and those who use them. This makes a discussion of purpose, completeness, and job relevance problematic because the criteria for judging these factors are themselves ambiguous. The desire to standardize all SMs is understandable. But, the need to do so is not supported by the findings of the study.

The fact is that for a number of SM users in the study, the SMs cannot carry the burden alone for task completion, contain (perceived) errors, and are not seen as being job related.

In view of these general findings, the notion that the purpose and completeness of the SM should be allowed to vary with the nature of the MOS is one that should be given serious consideration. When a task can be described in sufficient detail (within the SM format) so that the majority of soldiers (with appropriate Advanced Individual Training (AIT) and job experience) can complete it to meet the appropriate performance measures and task standards, it should be included in the SM. When this is not possible due to length and/or complexity, and another source is required to supplement the SM for the majority of soldiers, the basic steps should be listed but with the needed reference(s)clearly noted and the relevant section or sections from those references given.

It is recognized that too heavy a reliance on other documentation to support the SM is probably undesirable. And yet, to require that the SM be a one-stop document for MOSs that

have many complex tasks would exacerbate the bulk/binding problem noted earlier. It is seen, therefore, as a more sensible approach to allow the Proponent Schools to define the purpose, scope, and content of each SM and then to articulate that information clearly to the users of the SM.

This recommendation, while profound in its ultimate impact on the nature and use of the SM, is not seen as involving a significant expenditure of resources. For some Schools it might well result in cost savings, since the SM will undoubtedly become smaller where existing documentation can be used to better effect; for others, the need for additional task analytic work and refinement/expansion of the content of the SM may be required. However, the net effect should be a more practical document, one that more closely meets the individual needs of each MOS.

Readability. Clearly, a document that is not comprehensible to the average reader is not going to fulfill its purpose, even if that purpose is very well defined. Most soldiers reported finding the words in the SMs "easy to understand." However, the reading levels actually computed for the SMs used in the study were consistently above the average reading level of the Army enlisted person. Working toward the achievement of readability scores consistently at or below the average Army grade level is a recommendation that can certainly do no harm and has the potential to do considerable good.

Field Testing SMs

The data clearly show that procedures used at the time the SMs used in this study were prepared were not adequate to deal with problems related to completeness, accuracy, and job relatedness. To the extent that the problem still exists, it is recommended that a formal test and revision cycle be initiated. The essential steps of such a procedure are as follows:

1. Obtain best available analytic data on each task and/or obtain new task analytic data on tasks where needed

2. Decide on need for supporting documentation and the level of detail to be included in the SM.

3. Prepare draft versions of the SM for the tasks selected.

4. Option (1) - Test each task and its component steps on basis of comments obtained from both members of SM-user audience and their immediate supervisors.

Option (2) - Test on basis of observation of users actually performing the tasks in real or simulated job conditions, following the steps as specified.

5. Analyze results and revise SM as needed. Revisions in supporting documentation, the SQT Notice, and/or the SQT itself may also be indicated.

Although the scope of such an enterprise could be considerable, the benefits to the entire EPMS would be significant. Results would indicate not only the real usefulness and job relevancy of the SM per se, but would provide information on the quality of the task analyses upon which they are based, and the job relevancy of the SQT itself. It would also allow a test of the assumptions being made about the skill and knowledge level of graduates from AIT, and whether the Individual Training Plan (ITP) was correct in its allocation of tasks to their source of mastery.

Such pre-testing could be done best by the Proponent Schools themselves, since they would have the most to gain from the resulting improved SMs. Done initially on a pilot basis for those tasks to be tested on the next SQT cycle at the important 10/20 skill levels the field test program could then be expanded so that additional tasks could be tested at higher skill levels.

The implications of such a recommendation are, of course, far-reaching. It would require additional time and considerable resources to carry out the necessary test and revision steps. However, with such a test program the purpose, usefulness, and viability of the Soldier's Manual concept will be significantly enhanced. Without such a program, we believe that the purpose, completeness, and job relevance of SMs may continue to be problematic.

Usage Characteristics

Given the relationship between the SM and SQT, it is not surprising that SM usage is largely driven by the scheduling of the SQT. For example, nearly half of the senior-level enlisted and officer personnel who were interviewed indicated that from "less than half" to "none" of the soldiers under their charge used the SM at all, but that those who did use it did so primarily for purposes of studying for the SQT. In terms of general level of use, most of the senior enlisted and officer personnel said that SM usage increased substantially when the date for the SQT was announced (usually coinciding with the arrival of the SQT Notice).

These senior personnel were also generally critical of the SM as a training document. Half of them stated that the SM in its present form was not really very useful to the typical soldier (although 90% of them thought that it ought to be).

Indirect support for the low level of visibility of the SM also comes from the results of the soldier interview data. When asked, "What is the normal way for a soldier to advance from one skill level to another skill level? Be as specific and detailed as you can," only 19% (N=353) mentioned the SM, the SQT Notice, or the SQT itself! When asked if any specific documents are provided to the soldier to help in his or her skill level advancement, 78% of those interviewed said yes, but only slightly over half of them (52%) specifically mentioned the SM. Thus, 59% of those interviewed did not identify the SM as an aid to individual advancement in the Army!

These findings suggest that the level of support for the SM (as of mid 1979) may not be very high. Coupled with the finding that usage tends to be externally driven by the SQT, one must conclude that SM usage is not seen as a routine part of the soldier's individual job training activities.

While it was not the intention of this study to assess the SQT/SM "system," it remains a key finding of the study that to the extent that the SM is seen to be useful, its use is defined by both user and supervisor alike primarily in terms of taking the SQT. And to the extent that qualifying on the SQT is seen as an important element in one's promotion through the ranks, the SM then becomes an important part of one's career progression. The latter notion, however, is not well articulated by the average soldier due, perhaps, to the ambiguity, if not outright confusion, over the relationship between SQT and promotion among those interviewed.

It could be (and has been) argued that the SM should be formally divorced from the SQT (and, therefore, the promotion system), and that it should be presented to the soldier only as an individual job support and skill-building document. However, as long as the SQT exists and as long as the tasks included in it are drawn from the SM, it is unlikely that the separation between the two can be maintained. What is critical to their mutual success is that they both reflect a high degree of job relevance and that the SQT reflect a high degree of test and scoring integrity. To the extent that either of these becomes eroded, or are perceived to become so, the SM will be seen as a "requirement" rather than as a document central to one's real job proficiency and career advancement. One quote from a senior level interview is particularly germane:

> The SM is seen by most as a "good idea," as is the EPMS in general. It is going through growing pains. It can go four ways:

(1) survive and be useful,
(2) survive and be a requirement,
(3) survive and be a problem,
(4) not survive.

It is too early to tell which of these will, in fact, take place!

There is a real danger that the SM and SQT system will be seen as part of a set of "requirements," at which point the system will have lost much of its true value. The role played by those most responsible for carrying out IJT -- the squad and platoon leaders -- is critical (75% of those interviewed gave these individuals the major responsibility for conducting IJT). This is especially true of those in the non-combat MOSs, where SM usage tends to be weakest and most related to the "requirement" to pass the SQT, and of those in the lower ranks, where usage is also lower. The motivation to maintain proficiency in areas not directly related to one's daily job is especially problematic for these people. They are too busy learning and doing their jobs to be concerned with career or with other tasks within their MOS for which they are technically responsible, but for which they get little or no practice. Only by strong and consistent leadership from middle-level management could these persons be motivated to use the SM as intended. In turn, such leadership at the field level can be expected only when those who are responsible for preparing the SM and designing the SQT provide high quality materials, and support those who use them consistently and well.

There is (or was) a strong commitment to support the SM in principle, but serious reservations (if not outright pessimism) about the ability of those "in charge" to correct the problems perceived in the present system. A visible, real, and timely response to these problems can lead to real changes in the climate of support for the use of the SM. And as the data in this study clearly show, that climate of support is an essential ingredient to effective SM use.